

Science Shoebox Activity

Title: Measuring the Solar System

Grade 6 Earth and Space Science



Content Standard 6 - The Universe

Grade Learning Expectation: GLE 0607.6.2

Describe the relative distance of objects in the solar system from Earth.

Checks for Understanding: 0607.6.2 Construct a model of the solar system showing accurate positional relationships and relative distances.

State Performance Indicators: 0607.6.2 Explain how the relative distance from the Earth affects how they appear.

Objective: Students will create a model of the solar system using sentence strips and then they will calculate the approximate distances of the planets.

Materials:

pencil

2.5 in. X11.5 in. Sentence strip

Ruler

calculator

Background Knowledge for teachers

There are 8 planets one dwarf planet located in our solar system. The planets are made up of inner planets and outer planets. The inner planets are Mercury, Venus, Earth, and Mars. These 4 planets are Rocky and smaller than the 4 outer planets. The 4 outer planets are Jupiter, Saturn Uranus, and Neptune. These planets are much larger made mostly of gasses. The inner and outer planets are separated by an Asteroid Belt it is located between Mars and Jupiter. Pluto once considered the ninth planet is now considered a dwarf planet. The students will use the knowledge that the Earth is approximately 93 million miles from the sun. 93 million miles is equal to 1 Astronomical Unit (AU). The scale is 0.5 centimeters is equal to 1 AU.

Across the Curriculum

Math

Student will measure the distance from the sun to each of the objects or planets on their model solar system and using the formula 1AU or 93 million miles (93,000,000) is equal to 0.5 centimeters they will calculate the approximate distance from the sun to the different objects and planets.

SPI 0606.2.6 - Solve problems involving ratios, rates, and percent.

Social Studies

What Ancient civilization's beliefs are closest to our ideas and knowledge of the solar system today?

4.5.01.b Explain the cultures of the Western Hemisphere's native peoples prior to European contact.

Language Arts

Read "Our Solar System" by Seymour Simon and discuss what we found interesting. Did we learn anything new, what?

SPI 0501.6.1 Select questions used to focus and clarify thinking before, during, and after reading text.

References:

Lesson plan adapted from: Butsch, Clarissa. "Scale of the Solar System." n.d.: n. pag. *Better Lessons*. N.p.: Better Lessons.com, n.d. Web.
<http://betterlesson.com/lesson/108263/scale-of-the-solar-system>

****Clean up Procedures-** neatly place everything back in the box and replace the lid.

Measuring the Solar System- Answer Key

Materials needed: Sentence strip, ruler, calculator, and a pen or pencil

For the first part you will need your sentence strip and a pen or sharpie.

Steps for completing your model:

1. Write Sun on one end and Pluto on the other end.
2. Fold the Sun to Pluto and write Uranus in the crease.
3. Fold Pluto to Uranus and write Neptune in the crease.
4. Fold the Sun to Uranus and write Saturn in the crease.
5. Fold the Sun to Saturn and write Jupiter in the crease.
6. Fold the Sun to Jupiter and write Asteroid Belt in the crease.
7. Fold the Sun to the Asteroid Belt and write Mars in the crease.
8. Fold the Sun to Mars and write Venus in the crease.
9. Write Mercury between the Sun and Venus.
10. Only one planet is missing. Can you Name it? Write it between Venus and Mars.

The second part is a little tricky! This part is to be completed for your

Learning log.

You will use the scale 0.5 cm is equal 1 AU (93,000,000 miles) to calculate the approximate distances between the Sun and the Planets.

Materials needed: pencil, calculator, your model, and a ruler

1. Measure the distance between the Sun and Earth with your ruler. Now using the scale (ratio) $0.5\text{cm} = 1\text{AU}$ (93,000,000 miles) to calculate the approximate distance from the Sun to Earth. What is the distance?

Measurement- 0.5cm

$0.5\text{cm} = 1\text{AU}$

$1\text{AU} = 93,000,000 \text{ miles}$

It is 93,000,000 miles from the Sun to Earth.

2. Find the distance from the Sun to Uranus.

Measurement - 14cm

$0.5\text{cm}/1 \text{ AU} = 14\text{cm}/ x \text{ AU}$

$0.5\text{cm} \times = 14\text{cm}$

$x = 0.5\text{cm}/ 14\text{cm}$

$x = 28$

$28\text{AU} \times 93,000,000 =$

2,604,000,000miles

It is 2,604,000,000 miles from the Sun to Uranus

3. If Jupiter is half the distance from the Sun and Uranus, what is the distance from the Sun to Jupiter?

Uranus is 14cm or 28AU or 2,604,000,000 miles

$2,204,000,000 \text{ miles} \times 0.5 = 1,302,000,000 \text{ miles}$ or

$$14\text{cm} \times 0.5\text{cm} = 7\text{cm}$$

$$0.5\text{cm}/1\text{AU} = 7\text{cm}/x \text{ AU}$$

$$0.5x = 7\text{cm}$$

$$7/0.5 = 14\text{AU}$$

$$14\text{AU} \times 93,000,000 \text{ miles}$$

$$14\text{AU} = 1,302,000,000 \text{ miles}$$

It is 1,302,000,000 miles from the Sun to Jupiter.

4. If Pluto is twice the distance from the Sun to Uranus, how far is it from the Sun to Pluto?

$$\text{Uranus} = 14\text{cm} \text{ or } 28\text{AU} \text{ or } 2,604,000,000 \text{ miles}$$

$$2,604,000,000 \text{ miles} \times 2 = 5,208,000,000 \text{ miles} \text{ or}$$

$$0.5\text{cm}/1\text{AU} = 28\text{cm}/x \text{ AU}$$

$$28\text{cm}/0.5\text{cm} = 56\text{AU}$$

$$56\text{AU} \times 93,000,000 = 5,208,000,000$$

It is 5,208,000,000 miles from the Sun to Pluto.

5. Use your ruler and find the distance between Saturn and Neptune.

$$\text{Measurement} = 10.5\text{cm}$$

$$0.5\text{cm}/1\text{AU} = 10.5\text{cm}/x \text{ AU}$$

$$0.5\text{cm} \times = 10.5$$

$$10.5/0.5\text{cm} = 21\text{AU}$$

21AU X 93,000,000 miles

21AU = 1,953,000,000 miles

There is 1,953,000,000 miles in distance between Saturn and Neptune.

6. Does the distance between the Sun and the Planets surprise you and do you think this affects the way we see the planets from Earth?

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Directions:

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2. Find the distance from the Sun to Uranus.

3. If Jupiter is half way between the Sun and Uranus, what is the distance from the Sun to Jupiter?
4. If Pluto is twice the distance from the Sun to Uranus, how far from the Sun to Pluto?
5. Use your ruler and find the distance between Saturn and Neptune.
6. Does the distance between the Sun and the Planets surprise you and do you think this affects the way we see the planets from Earth?